

Notice of Allowability

Application No.

09/787,002

Examiner

Kevin C. Harper

Applicant(s)

OZEGOVIĆ, JULIJE

Art Unit

2666

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Applicant Interview of July 5, 2005.
2. ☒ The allowed claim(s) is/are 1 and 3-15 (renumbered as 1-2, 5-6, 11-12, 3-4, 7-10 and 13-14, respectively).
3. ☒ The drawings filed on 12 March 2001 are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

DANG TON
PRIMARY EXAMINER

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
 6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☒ Interview Summary (PTO-413),
Paper No./Mail Date 20050705
7. ☒ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____

Examiner's Amendment

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in e-mail correspondences with the applicant between June 21 and July 5, 2005.

The application has been amended by replacing the claims as follows:

1. Packet switching data communications network with closed loop implicit feedback flow control comprising
 - a Window-Time-Space Flow Control, WTFC, where a determined single server queuing system model with a finite number of packets and known value of a total network capacity point W_0, T_0 of a total network window W_0 , a total serving time T_0 and an aggregated propagation time T_p define a window - time plane of a packet window W and a delay time T , for determining
 - a hyperbola through said network capacity point W_0, T_0 and a set of network response curves each for a fraction of total network capacity α , said hyperbola and said curves contained in said window - time plane, wherein each said response curve is determined with a break point lying on said hyperbola through said network capacity point W_0, T_0 , and
 - a current W, T point measurement, wherein said window - time plane is used to determine whether a W, T point is positioned above or below said hyperbola, and to calculate optimal value of said capacity fraction α and said break point of the current response curve, wherein said break point is used to calculate an optimal window $W_0(\alpha)$, an optimal delay time $T_0(\alpha)$, and an optimal packet sending period $t''(\alpha)$;

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- a terminal that uses said window - time plane and said W,T point measurement to obtain said optimal packet sending period and said optimal window, and is constructed using a packet receiver (113) and a packet transmitter (101) of packets or other data units;
- a node (201) that may signal said total network capacity W_0, T_0 by updating a set of elementary network channel parameters in packet headers, wherein said network parameters are a cumulative propagation time T_{p0} , a cumulative reciprocal capacity and a minimal channel capacity C_b .
5. Network of Claim 1 wherein said packet transmitter (101) performs
 - packet sending, when two conditions are both satisfied: said optimal packet sending period $t''(\alpha)$ expires and said optimal window $W_0(\alpha)$ is not filled,
 - a check of said optimal packet sending period $t_0''(\alpha)$ expiration, in a $t_0''(\alpha)$ calculation process (107) with a one credit buffer (108),
 - a check of said optimal window $W_0(\alpha)$ not being filled in a process of window check (111) that verifies whether the current window is less than said optimal window $W_0(\alpha)$.
 6. Network of Claim 1 wherein parameters are provided by said packet receiver (113) to said packet transmitter (101) after acknowledgment reception, said packet transmitter (101) further comprises:
 - a W,T point measurement process (106) adapted to use a transmission time of the packet k $t(P_k)$ and an acknowledgement time of a packet k $t(A_k)$ in formula $T = t(A_k) - t(P_k)$, and a last packet sequence number P_k and a last acknowledgment sequence number A_j in formula $W = P_k - A_j$ and to use a window correction formula $W_k = (k - j) \left(t(A_k) - t(P_k) \right) / \left(t(A_k) - t(A_j) \right)$ to obtain corrected value for window W;
 - a total capacity estimation and correction process (109) adapted to calculate and correct said total network capacity point W_0, T_0 and said aggregated propagation time T_p .
 7. Network of Claim 1 wherein said packet receiver (113) comprises

an extraction process (114) adapted to extract said cumulative propagation time from a backward cumulative propagation time variable T_{p0b} , said cumulative reciprocal capacity from a backward cumulative reciprocal capacity variable S_{cib} , said minimal channel capacity from a backward minimal channel capacity variable C_{iminb} , a last acknowledgment sequence number from a packet header and a transmission time from a backward transmission time variable $T(p_k)_b$ or from a local record, and to deliver said extracted parameters to the packet transmitter (101).

8. Network of Claim 3 wherein said header initialization process (103) performs initialization of packet header variables to:

set a forward last acknowledgment variable a_{jf} to the value of a last acknowledgment sequence number received,

set a backward last acknowledgment variable a_{jb} to the value of a forward last acknowledgment variable received in packet from the opposite direction, whose acknowledgment number is carried by a new packet,

set a forward transmission time variable $T(p_k)_f$ to actual local time,

set a backward transmission time variable $T(p_k)_b$ to the forward value of said transmission time variable received in packet from the opposite direction, whose acknowledgment number is carried by a new packet.

9. Network of Claim 3 wherein said header initialization process (103) performs, when said total network capacity signaling is used, initialization of packet header variables to:

set a forward cumulative propagation time variable T_{p0f} to zero;

set a forward cumulative reciprocal capacity variable S_{cif} to zero;

set a forward minimal channel capacity variable C_{iminf} to the maximal value;

copy values from said forward variables T_{p0f} , S_{cif} , and C_{iminf} received in the opposite direction packet to backward variables T_{p0b} , S_{cib} , and C_{iminb} respectively.

10. Network of Claim 5 wherein said $t_0''(\alpha)$ calculation process (107) further comprises:

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a connection startup algorithm for smooth packet sending, that acts upon expiration of a time period initialized, and

before first acknowledgment reception, and if there is no credit stored in said credit buffer, sets said credit buffer to 1 and reinitiates the same value of said time period,

before first acknowledgment reception, and if there is credit stored in said credit buffer, initiates double value of said time period and initiates packet emitting,

after first acknowledgment reception, sets said credit buffer to 1 and initiates packet emitting.

11. Network of Claim 6 wherein said total capacity estimation and correction process (109) performs, when said total network capacity signaling is used:

a calculation of said aggregated propagation time T_p by

$$T_p = \sum_i T_{pi} + \sum_i T_{si} - T_{sb} = T_{p0} + \overline{M} \left(\sum_i 1/C_i - 1/C_b \right)$$

where \overline{M} stands for average packet length,

a calculation of said total serving time T_0 by $T_0 = T_s + T_p$

where T_s stands for service time available from the said minimal channel capacity,

a calculation of said total network window W_0 by $W_0 = T_0/T_s$,

using extracted parameters from first or every packet received from the opposite direction.

12. Network of Claim 6 wherein said total capacity estimation and correction process (109) performs, when said total network capacity signaling is not used,

a calculation of said total serving time T_0 using $T_0 = T$ after a first acknowledgment is received,

a calculation of said total network window W_0 using $W_0 = T_0/(T - T_0)$ after a second acknowledgment is received,

using extracted parameters from every packet received from the opposite direction.

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13. Network of Claim 6 wherein said total capacity estimation and correction process (109) performs, when said total network capacity signaling is not used, if measured $T < T_0$:

a correction of said total serving time T_0 using minimal measured value of said delay time T ,

$$T_0 = \min(T),$$

a correction of said total network window W_0 using $W'_0 = \max\left(\left(T'_0/T_0\right)W_0, W\right)$ if $T < T_p$, otherwise

$$\text{using } W'_0 = T'_0 / \left(T'_0 - T_p\right) \text{ and } W'_0 = T'_0 / T_s, \text{ where } W'_0 \text{ and } T'_0 \text{ stand for corrected values,}$$

a correction of said aggregated propagation time T_p using $T_p = T_0 (W_0 - 1) / W_0$,

by using measured parameters from every packet received from the opposite direction.

14. Network of Claim 1 wherein the node (201) is adapted to forward packets with forwarding process (202) and further comprises, when said total network capacity signaling is used,

a capacity signaling process (203).

15. Network of Claim 14 wherein said capacity signaling process (203) performs

an updating of a forward cumulative propagation time variable T_{p0f} of a first or every packet using

$$T_{p0} = \sum_i T_{pi},$$

an updating of a forward cumulative reciprocal capacity variable S_{cif} of a first or every packet using

$$T_{s0} = \overline{M} \sum_i 1/C_i,$$

an updating of a forward minimal channel capacity variable C_{iminf} of a first or every packet using

$$C_b = \min_i(C_i).$$

Allowable Subject Matter

Claims 1 and 3-15 are allowed.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Hahne et al. (US 5,163,046) discloses setting a window size for data transmission (fig. 6). Ozveren et al. (US 5,617,409) discloses a method of flow control (fig. 6).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Harper whose telephone number is 571-272-3166. The examiner can normally be reached weekdays from 11:30 AM to 7:00 PM ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Seema S. Rao, can be reached at 571-272-3174. The centralized fax number for the Patent Office is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications associated with a customer number is available through Private PAIR only. For more information about the PAIR system, see portal.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Kevin C. Harper

July 25, 2005



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PRIMARY EXAMINER